TOSHIBA INTEGRATED CIRCUIT TECHNICAL DATA

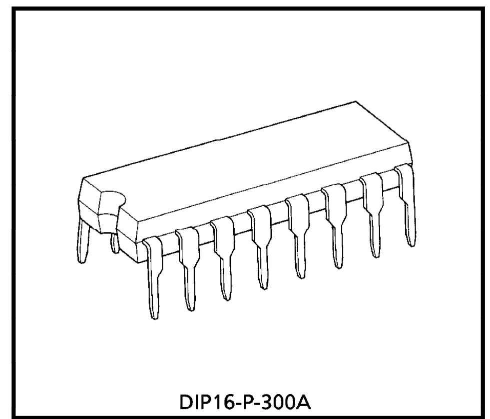
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT

TA7630P

SILICON MONOLITHIC

DUAL. VOLUME / BALANCE / TONE (BASS / TREBLE) DC CONTROL IC

The TA7630P is DC controlled dual volume, balance, tone (Bass, treble) IC. As these dual channels are constructed on one chip, this IC is excellent in pair characteristic.
It is suitable for automobile stereo, radio cassette, music center, TV multiplex sound receiver and remote controlled applications.



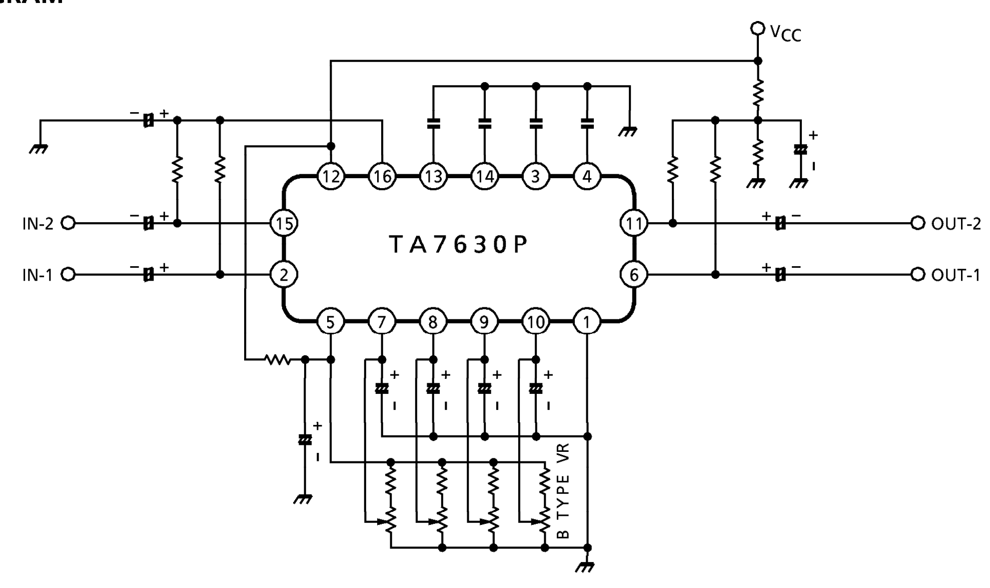
DIP16-P-300A

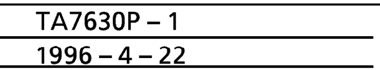
Weight : 1.00g (Typ.)

FEATURES

- Wide Power Supply Voltage Range
  ; Single Supply $V_{CC\,(opr)} = 8 \sim 14V$ (Ta = 25°C)
  Dual Supply $V_{CC} - V_{EE\,(opr)} = \pm 4 \sim \pm 7V$ (Ta = 25°C)
- Wide Volume Control Range ; $V_R = 80dB$ (Typ.)
- Excellent Cross Talk ; C.T. = 70dB (Typ.)
- Stable for Temperature Drift.
- Wide Tone Control Range
  Control Range ; $V_B = 10dB$ (Typ.) at f = 1kHz→100Hz
  $V_T = 12dB$ (Typ.) at f = 1kHz→20kHz

BLOCK DIAGRAM





PIN CONNECTION

PIN No.	SYMBOL	EXPLANATION	PIN No.	SYMBOL	EXPLANATION
1	V_{EE}	Negative Power Supply	9	BASS	Bass Control
2	INPUT-1	Input channel-1	10	TRBL	Treble control
3	T_H (1)	Treble turning frequency setting.	11	OUTPUT-2	Output channel-2
4	T_L (1)	Bass turning frequency setting.	12	V_{CC}	Power supply
5	REF CONT	Reference control	13	T_L (2)	Bass turning frequency setting
6	OUTPUT-1	Output channel-1	14	T_H (2)	Treble turning frequency setting
7	BAL	Balance Control	15	INPUT-2	Input channel-2
8	VOL	Volume Control	16	REF SIG	Reference signal

MAXIMUM RATINGS (Ta = 25°C)

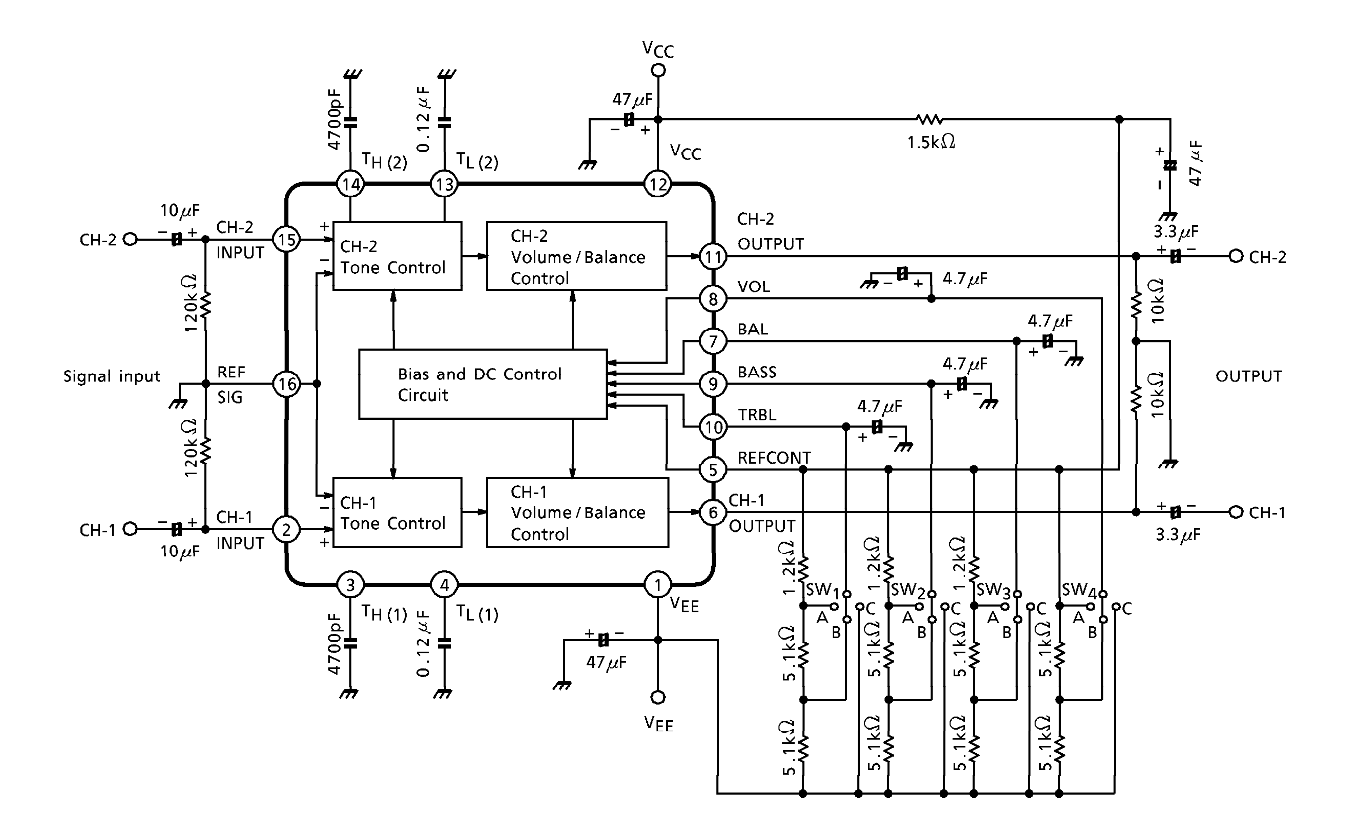
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	14	V
Power Dissipation	P_D (Note)	750	mW
Operating Temperature	T_{opr}	−25~75	°C
Storage Temperature	T_{stg}	−55~150	°C

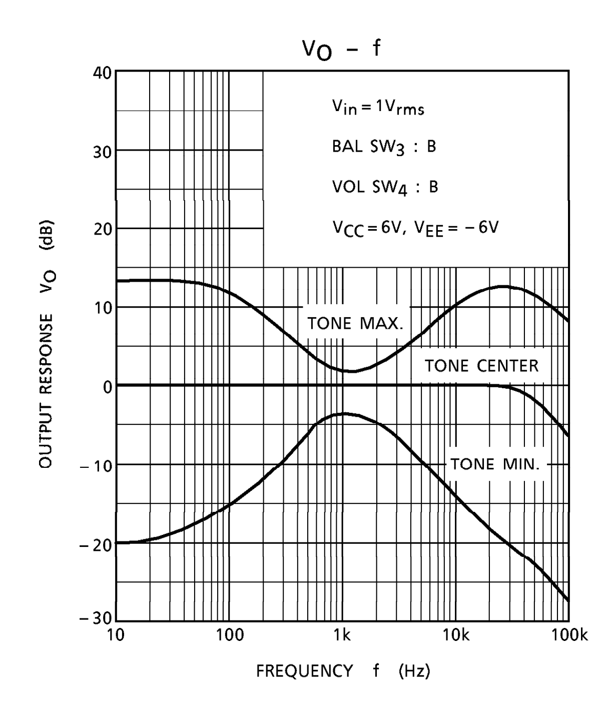
(Note) Derated above Ta = 25°C in the proportion of 6mW / °C.

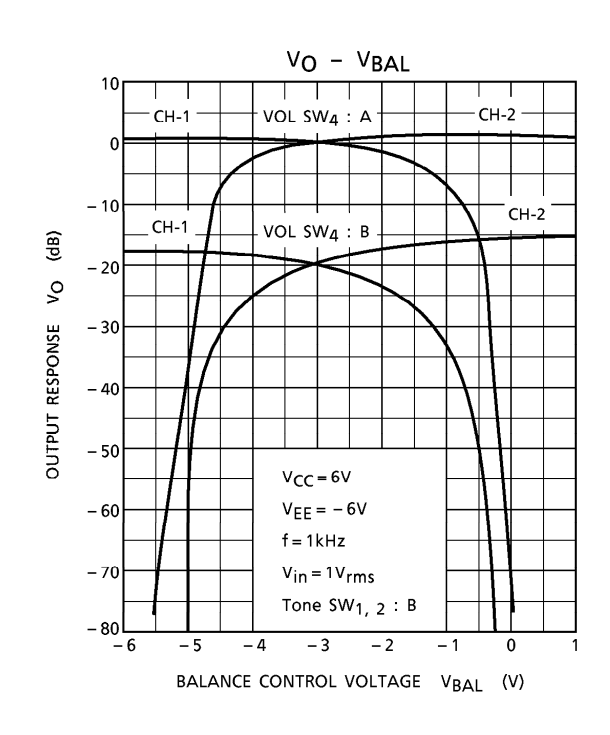
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 6V$, $V_{EE} = -6V$, f = 1kHz, Ta = 25°C)

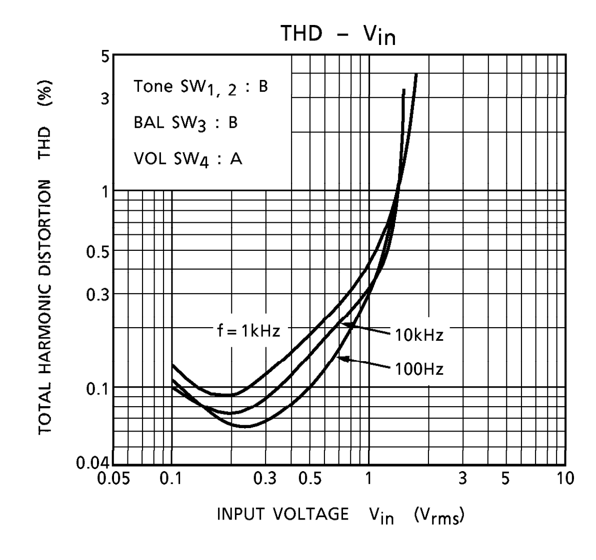
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	I_{CCQ} (1)	—	V_{CC}, $V_{EE} = \pm 4V$	—	11	17	mA
	I_{CCQ} (2)	—	VOL / BAL / BASS / TRBL $SW_{1 \sim 4}$: B	10	18	25	
Maximum Input Voltage	V_{in}	—	BASS / TRBL / BAL $SW_{1 \sim 4}$: B VOL SW_4 : A, THD = 1%	—	—	1	V_{rms}
Maximum Output Voltage	V_{out}	—	BASS / TRBL / BAL SW_1, SW_2, SW_3 : B VOL SW_4 : A, THD = 1%	1	—	—	V_{rms}
Voltage Gain	G_v	—	$V_{in} = 1V_{rms}$ BASS / TRBL / BAL $SW_{1 \sim 3}$: B VOL SW_4 : A	−0.5	2.0	4.5	dB
Channel Balance	C.B. -1	—	BASS / TRBL / BAL $SW_{1 \sim 3}$: B VOL SW_4 : A, $V_{in} = 1V_{rms}$	−3	0	3	dB
	C.B. -2	—	VOL / BASS / TRBL / BAL $SW_{1 \sim 4}$: B f = 100Hz~20kHz, $V_{in} = 0.1V_{rms}$	−3.5	0	3.5	
Volume Control Range	V_R	—	BASS / TRBL / BAL $SW_{1 \sim 3}$: B, $V_{in} = 1V_{rms}$ VOL SW_4 : A→C	70	80	—	dB
Bass Control Range	V_B MAX	—	VOL / BAL $SW_{3, 4}$: B BASS / TRBL $SW_{1, 2}$: A, $V_{in} = 1V_{rms}$ f = 1kHz→100Hz	7	11	14	dB
	V_B MIN	—	VOL / BAL $SW_{3, 4}$: B BASS / TRBL $SW_{1, 2}$: C, $V_{in} = 1V_{rms}$ f = 1kHz→100Hz	−15	−11.5	−7	
Treble Control Range	V_T MAX	—	VOL / BAL $SW_{3, 4}$: B BASS / TRBL $SW_{1, 2}$: A, $V_{in} = 1V_{rms}$ f = 1kHz→20kHz	7	11	14	dB
	V_T MIN	—	VOL / BAL $SW_{3, 4}$: B BASS / TRBL $SW_{1, 2}$: C, $V_{in} = 1V_{rms}$ f = 1kHz→20kHz	−20	−14	−10	
Tone Error	ΔG_v	—	VOL / BAL $SW_{3, 4}$: B BASS / TRBL $SW_{1, 2}$: C→A $V_{in} = 1V_{rms}$	—	6	10	dB
Total Harmonic Distortion	THD	—	BASS / TRBL / BAL $SW_{1 \sim 3}$: B VOL SW_4 : A, $V_{out} = 150mV_{rms}$	—	0.1	0.35	%
Output Noise Voltage	V_{no}	—	BASS / TRBL / BAL $SW_{1 \sim 3}$: B VOL SW_4 : A BPF = 50Hz~20kHz, input open	—	130	300	μV_{rms}
Cross Talk	SEP	—	BASS / TRBL / BAL $SW_{1 \sim 3}$: B VOL SW_4 : A, $V_{out} = 1V_{rms}$	—	−70	—	dB
Control Terminal Input Resistance	R_{IN}	—	pin⑧, ⑨, ⑩	—	500	—	kΩ
			pin⑦	—	200	—	

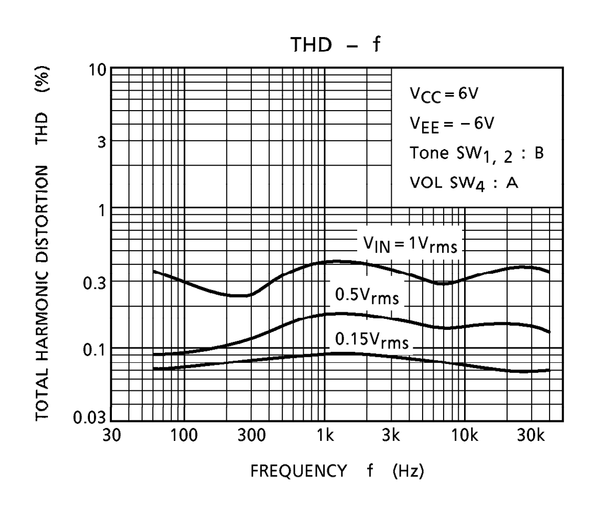
TEST CIRCUIT

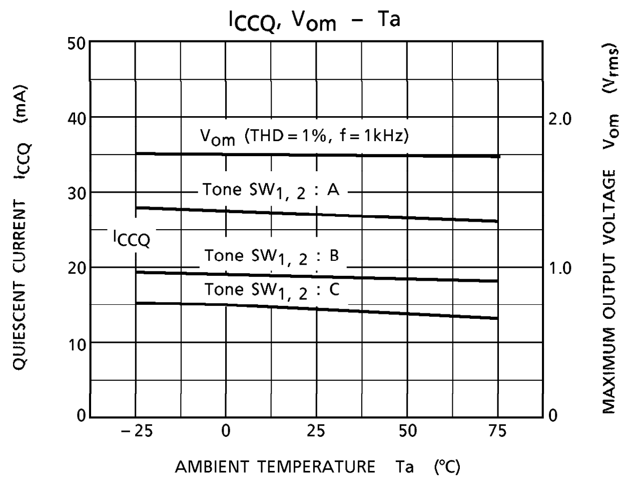


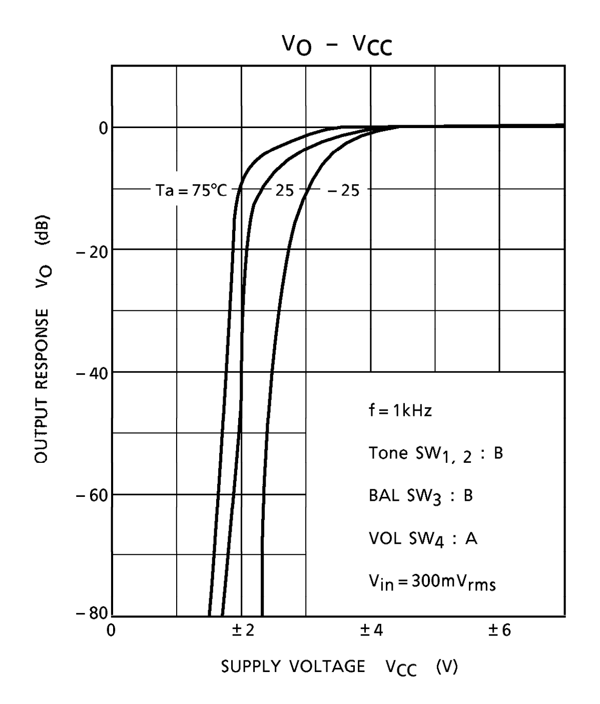

VO – f
Vin = 1Vrms
BAL SW3 : B
VOL SW4 : B
VCC = 6V, VEE = – 6V
TONE MAX.
TONE CENTER
TONE MIN.
OUTPUT RESPONSE VO (dB)
FREQUENCY f (Hz)
40
30
20
10
0
– 10
– 20
– 30
10
100
1k
10k
100k

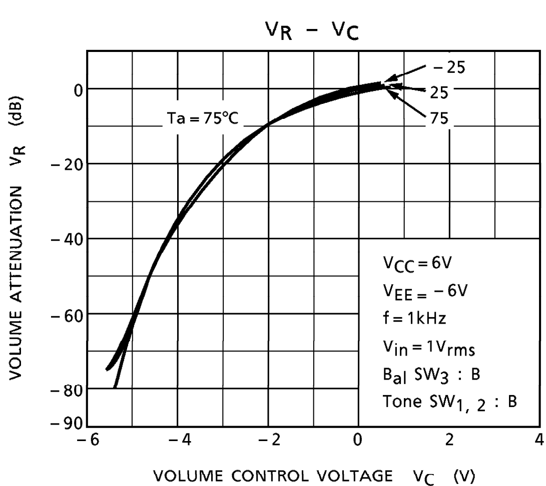

VO – VBAL
CH-1
VOL SW4 : A
CH-2
CH-1
VOL SW4 : B
CH-2
VCC = 6V
VEE = – 6V
f = 1kHz
Vin = 1Vrms
Tone SW1, 2 : B
OUTPUT RESPONSE VO (dB)
BALANCE CONTROL VOLTAGE VBAL (V)
10
0
– 10
– 20
– 30
– 40
– 50
– 60
– 70
– 80
– 6
– 5
– 4
– 3
– 2
– 1
0
1

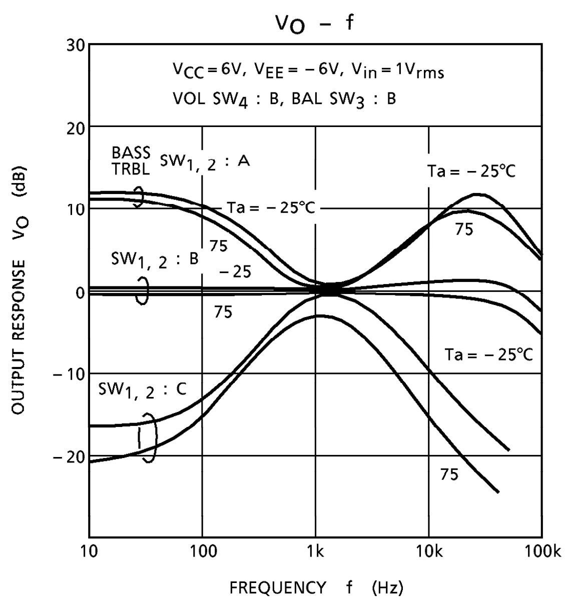

THD – Vin
Tone SW1, 2 : B
BAL SW3 : B
VOL SW4 : A
f = 1kHz
10kHz
100Hz
TOTAL HARMONIC DISTORTION THD (%)
INPUT VOLTAGE Vin (Vrms)
5
3
1
0.5
0.3
0.1
0.04
0.05
0.1
0.3
0.5
1
3
5
10

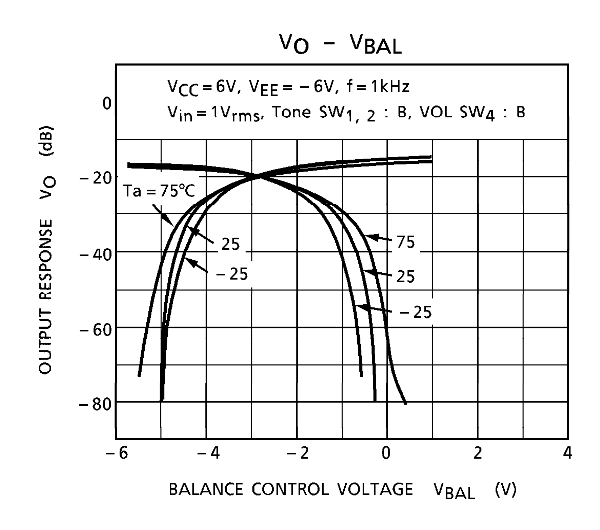

THD – f
VCC = 6V
VEE = – 6V
Tone SW1, 2 : B
VOL SW4 : A
VIN = 1Vrms
0.5Vrms
0.15Vrms
TOTAL HARMONIC DISTORTION THD (%)
FREQUENCY f (Hz)
10
3
1
0.3
0.1
0.03
30
100
300
1k
3k
10k
30k


ICCQ, Vom – Ta
QUIESCENT CURRENT ICCQ (mA)
MAXIMUM OUTPUT VOLTAGE Vom (Vrms)
Vom (THD = 1%, f = 1kHz)
Tone SW1, 2 : A
ICCQ
Tone SW1, 2 : B
Tone SW1, 2 : C
AMBIENT TEMPERATURE Ta (°C)


VO – VCC
OUTPUT RESPONSE VO (dB)
Ta = 75°C
25
– 25
f = 1kHz
Tone SW1, 2 : B
BAL SW3 : B
VOL SW4 : A
Vin = 300mVrms
SUPPLY VOLTAGE VCC (V)

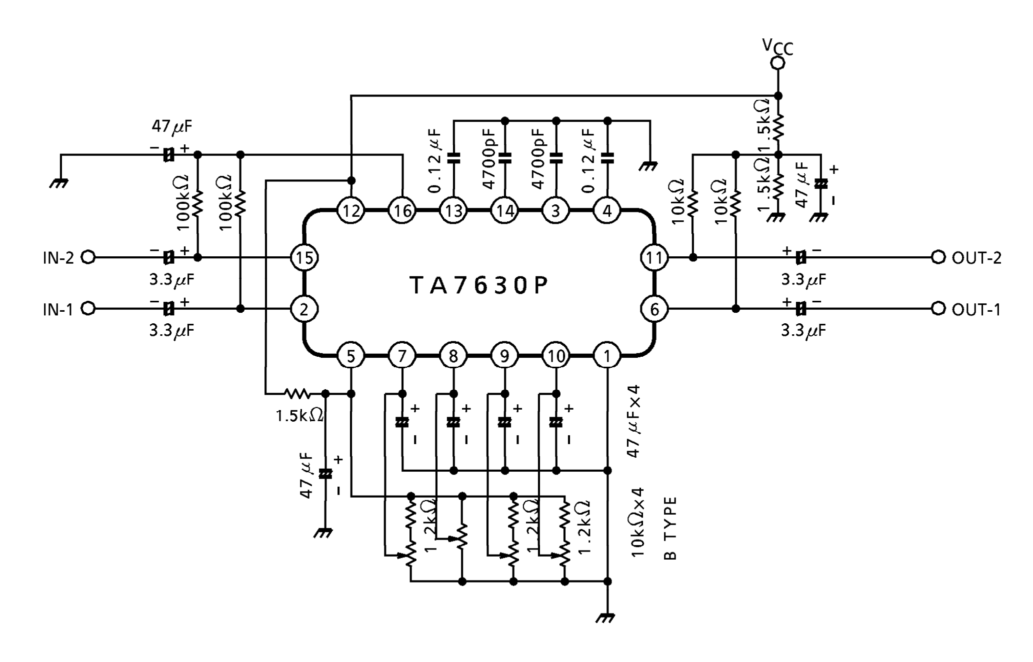

VR – VC
VOLUME ATTENUATION VR (dB)
Ta = 75°C
– 25
25
75
VCC = 6V
VEE = – 6V
f = 1kHz
Vin = 1Vrms
Bal SW3 : B
Tone SW1, 2 : B
VOLUME CONTROL VOLTAGE VC (V)


VO – f
OUTPUT RESPONSE VO (dB)
VCC = 6V, VEE = – 6V, Vin = 1Vrms
VOL SW4 : B, BAL SW3 : B
BASS TRBL SW1, 2 : A
Ta = – 25°C
75
SW1, 2 : B
– 25
SW1, 2 : C
FREQUENCY f (Hz)

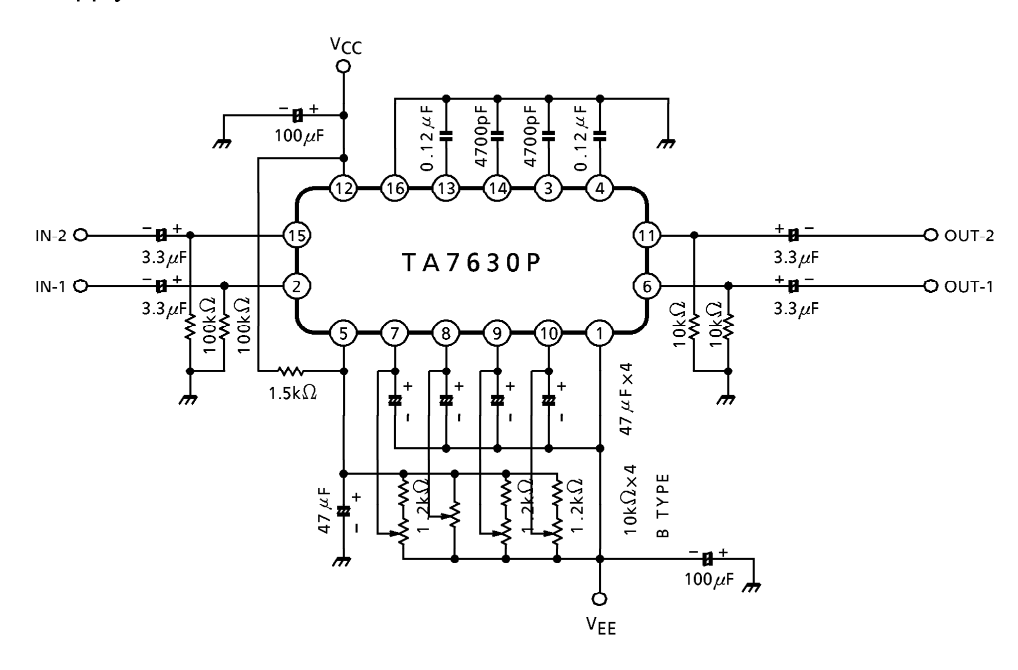

VO – VBAL
OUTPUT RESPONSE VO (dB)
VCC = 6V, VEE = – 6V, f = 1kHz
Vin = 1Vrms, Tone SW1, 2 : B, VOL SW4 : B
Ta = 75°C
25
– 25
75
BALANCE CONTROL VOLTAGE VBAL (V)

APPLICATION CIRCUITS

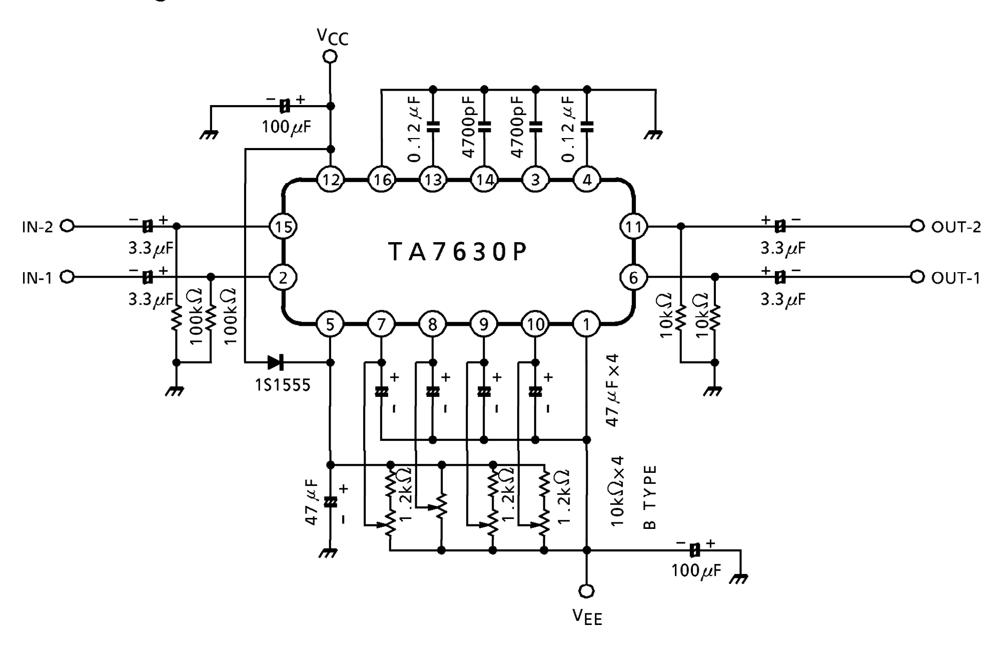
1. Single power supply



2. Dual power supply



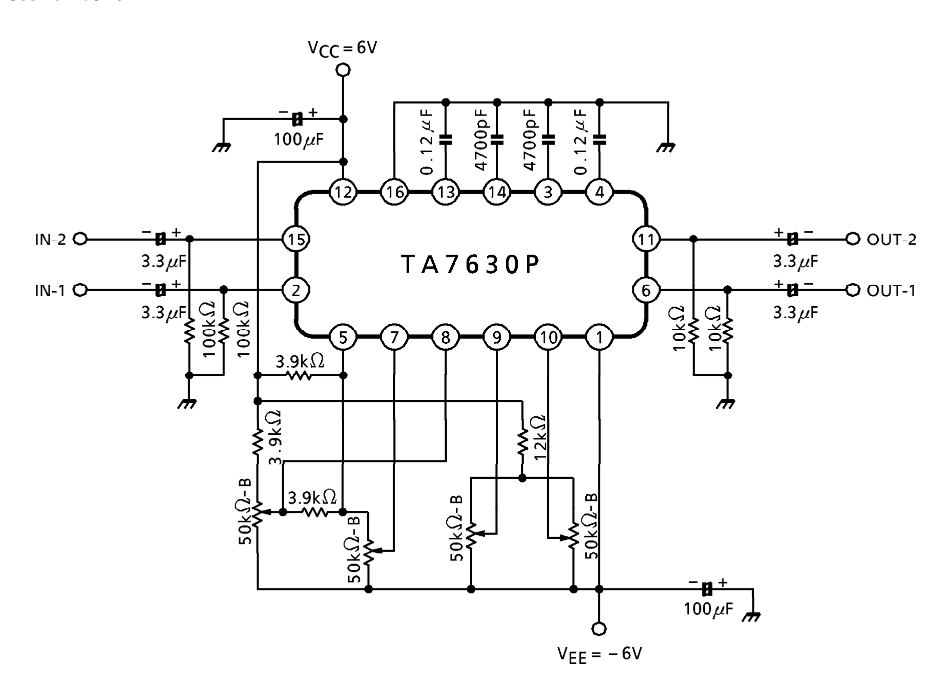
3. Application circuit using diode at reference terminal

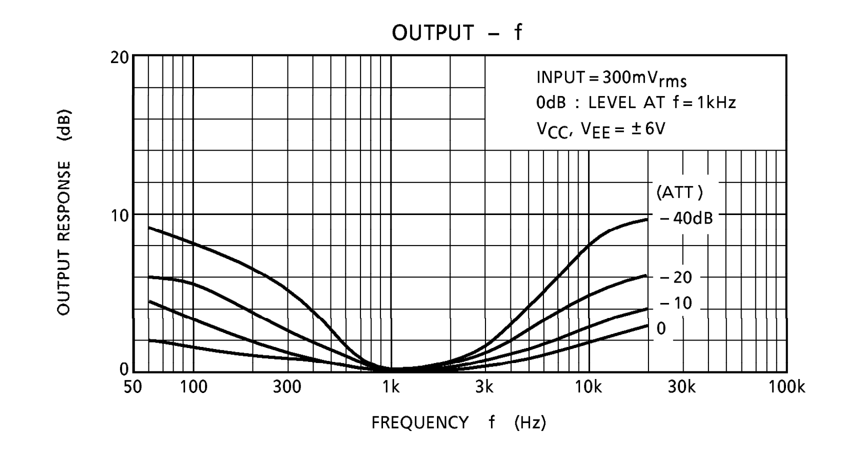


The application circuit using diode between Pin⑤ and Pin⑫ has the following merits.

1. When each control terminal is drived by high impedance, the electrolytic capacitor between terminal ⑤ and GND operates as the back up capacitor, so that the rise time is short at the ON-OFF repetation of supply voltage.
2. When the current drain into the each control terminal varies by control voltage, the voltage of terminal ⑤ scarcely varies.
   It means a stable reference voltage.

4. Quasi-loudness circuit

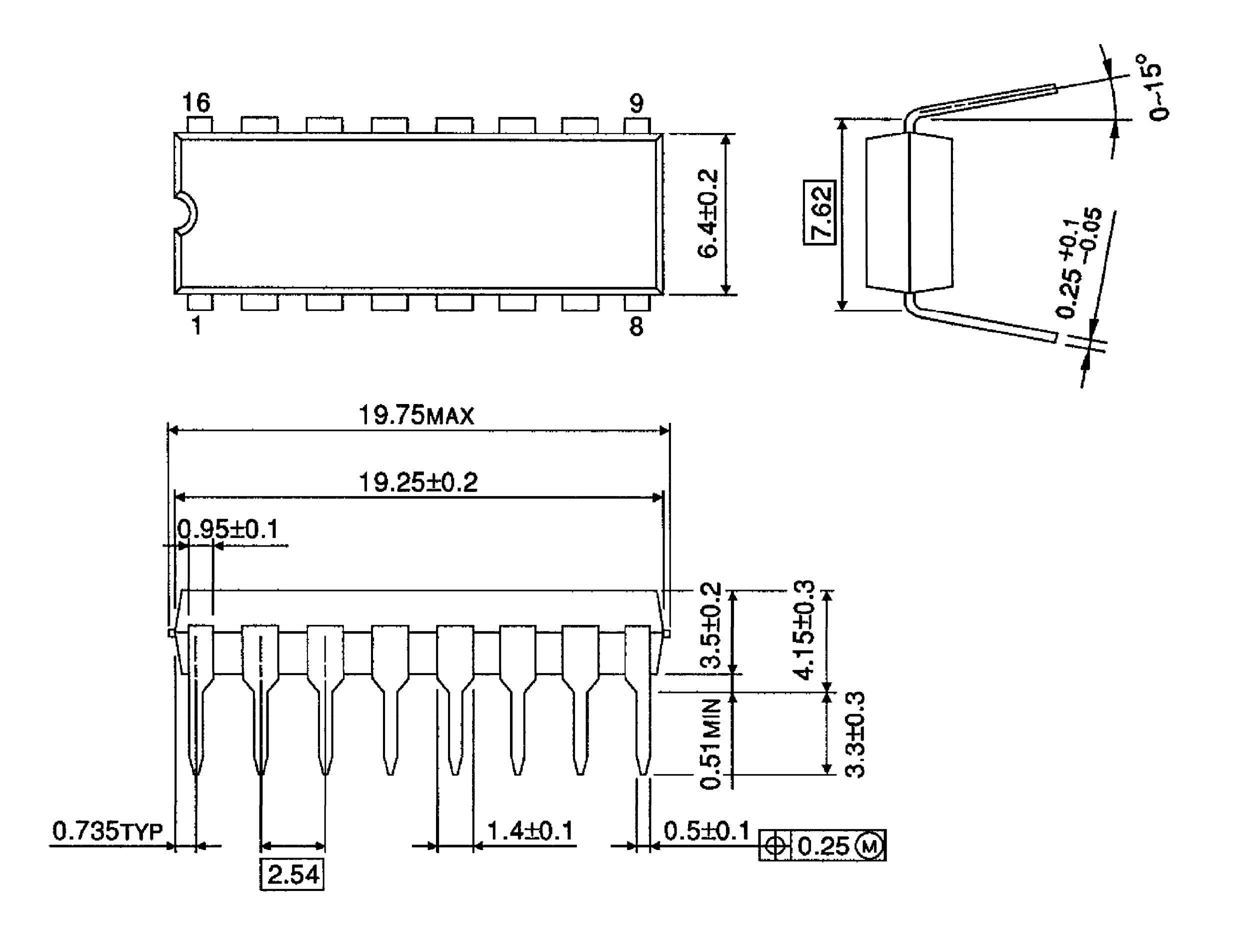




OUTLINE DRAWING

DIP16-P-300A

Unit : mm



Weight : 1.00g (Typ.)